

## FRactal Dimension of Measuring Network: Implications in Interpolation and Detectability

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Spatial locations of many geophysical data sets are inhomogeneously distributed. Gridding of such data suffers from the interpolation errors which are manifested in terms of spurious anomalies due to aliased interpolated data. Short wavelength anomalies of potential field data produce aliasing, which can be minimized using fractal analysis. There are many techniques for characterization of data distribution viz. Nearest Neighbours Index, Morisita Index, Thiessen/ Voronoi polygons and Coefficient of Representativity. The fractal dimension of measuring network characterizes the data distribution and represents the density of data distribution in simplest way unlike other mentioned techniques. Using fractal dimension optimum gridding interval can be obtained which is used for optimum interpolation interval obeying Shannon's sampling theorem. The optimum interpolation interval is the shortest length at which the scaling regime is constant. The technique is applied on a few synthetic data distributions and on a real gravity/magnetic data set collected in Vindhyan basin, India. The fractal dimension of the measuring network is determined using box-counting method and the detectability limit of the source distribution has been obtained for the real data of Vindhyan basin<sup>[1]</sup>. A fractal dimension of recently obtained data set in Vindhyan basin is found to be 1.68, leading to detectability limit of 0.32. Thus sources with fractal dimension less than 0.32 can not be detected with the said measuring network.

**Keywords:** fractal dimension, detectability limit, interpolation

### References

[1] V.P. Dimri, 1998, Fractal behavior and detectability limits of geophysical surveys, *Geophysics*, 63, 1943-1947.